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Unlocking the Potential of Aqueous and Aprotic Metal-air Batteries

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Abstract

Energy storage plays, undoubtedly, a fundamental role in the process of total decarbonization of the global economy that is expected to take place in the coming decades. The energy transition to a renewable and sustainable generation is the solution to reduce greenhouse gas emissions and thus achieve the European Commission´s goal of becoming the world´s first decarbonized economy. In this transition, beyond li-ion technologies will play a key role to meet the increasing energy demand that cannot be covered by Li-ion batteries solely. In this scenario, sodium-oxygen and zinc air batteries have become an attractive alternative due to their high gravimetric energy densities (1605 or 1108 Wh/kg based on Na_2O_2 or NaO_2, respectively; and 1086 Wh/kg based on ZnO discharge products,) resulting from the use of an oxygen-based phase-change reaction (potentially reducing the weight and freeing up space for other components).

In this talk, a general overview of these systems will be given along with the materials requirement and system performance. These batteries have been considered as the holy grail of battery research due to their high theoretical energy densities; however, several challenges remain to be solved before commercialization.